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ABSTRACT

This study investigated how inservice teacher education on teaching thinking skills affected teachers' self-reported thinking behaviors and teaching style, focusing on similarities and differences among teachers in the U.S. and Costa Rica. A group of 28 experienced U.S. public school teachers completed 2 different 5-day training sessions in cognitive strategy instruction and in methods of mediated learning, and a group of 12 Costa Rican public school teachers received similar training. Teachers then systematically implemented cognitive strategy instruction at least twice a week for a year. They also included metacognitive discussion with their students. After 1 year, teachers were asked to answer questions on how they approached problem solving differently and what they were doing differently as teachers as a result of teaching thinking skills. Results indicated that important self-perceived changes occurred in the teachers as a result of the training, both for themselves as adults and for their general teaching styles. The training had overall similar outcomes on both groups, but the perceived effects on themselves differed between the groups. (Contains 11 references.) (SM)

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A Cross-Cultural Study of Effects on Professionals

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Teachers of Thinking: A Cross-Cultural Study of Effects on Professionals

Abstract

The effects of in-service education in teaching thinking skills on teachers' self-reported thinking behaviors and teaching style was investigated with an American group and a Costa Rican group of teachers. Both similar and different effects on personal problem-solving strategies and teaching behaviors were reported across the two groups. Explanations are proposed for the differences in relation to educational traditions in the two countries.

INTRODUCTION

The effects of thinking skills programs on learners are being widely studied today, but far less study has been done on the effects on teachers themselves. In the last decade, some instructional programs in cognitive education have focused on the role of the mediation process. Unlike "traditional" instructors, teachers as mediators function in a fundamentally different manner because they consistently guide and probe students' responses, suggest alternatives, ask for elaboration, restate student comments to provide additional insights, and use appropriate pauses to allow students to think on their own, as opposed to didactic instruction.

Vygotsky's work provided an essential focus for this trend--in fact, Vygotsky called mediation the central fact of psychology (Wertsch, 1985). Presseisen & Kozulin (1992) indicate that Vygotsky suggested three important kinds of mediation--material tools, psychological tools, and other human beings. The work of Feuerstein (1980) represents a milestone in psychology and in education because of its emphasis on Mediated Learning Experience (MLE), and the characteristics of that experience which include intentionality, reciprocity, and transcendence.

Although higher-level problem-solving strategies form the basis of many cognitive education programs, they are necessary but not sufficient to promote higher cognition in the classroom. Presseisen (1993), for example, suggests that we must also use the "socially shared cognition" of the classroom to understand the learner's higher-order cognitive states; she adds that if we accept that knowledge in the classroom is distributed among the human beings there, then educators must explore ways in which the learners can construct knowledge jointly. This

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concept of constructivism is becoming widely accepted in education, characterized by the active participation of learners in the construction of meaning.

While numerous reports analyze how cognitive-strategy instruction affects school-age learners in a variety of contexts, relatively little study has been done of the effects on teachers from being trained in and implementing cognitive-strategy programs. These effects are important to study for several reasons: (1) those who conduct such professional development for teachers and program directors need information on the changes--if any--in the teachers who complete the training in terms of both the types and depth of theses changes; (2) the likelihood of a lasting change in teaching toward constructivism may be more likely if the teacher's one's own thinking processes are also re-oriented toward higher-level cognitive processing; (3) the self-reflection on own thinking may make more conscious and lasting any such changes occurring from the training or implementation of cognitive programs with learners; and (4) the results of studies may assist in the revision of pre-service teacher education programs in regard to what components of cognitive-strategy instruction should be incorporated into the teacher preparation curriculum.

The present study posed three research questions:

1. When teachers as adults learn to apply mediated learning experiences with their students, what effects are found on the teachers themselves as adult problem-solvers and thinkers?

2. When teachers practice applying mediated learning their experiences with their students, what effects are found on their teaching style?

3. To what extent will the responses to these questions be similar across teachers from different cultures?

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Two pilot qualitative studies with teachers from two countries (the United States and Costa Rica) are presented to analyze the effects on educational professionals of teaching thinking-skills programs using MLE methods, using interview data and self-analysis.

The ages of the adult subjects in each study ranged from 25-55 years old. All had experience as teachers for at least three years, and none had previous formal training in the teaching of thinking prior to the training that preceded this investigation.

The investigator hypothesized that a positive effect on teachers would have two sources: (1) the effect on the adult professional that can be attributed to the actual professional training experiences; and (2) the longer-term effects on the professional's own teaching methodology that result from the accumulated experience in implementing thinking skills with learners in the classroom. The effects were investigated after two groups of teachers especially trained to teach thinking skills had implemented thinking skills with children for several months.

In comparing the effects on teachers from the two countries, the investigator also expected differences between the two cohorts. While both groups were of the same age range, experience rage, and gender (all women in both groups), their respective cultural contexts and expectations of the teachers by their administrators were different. The Costa Rican cohort were members of a Latin American culture and had Spanish as their primary language; their preparation as pre-service teachers and expectations for them of their administrators had emphasized content subject matter as the priority--with relatively little focus on learning processes. The American cohort were users of English as a first language and their pre-service education had focused on both subject matter and learning processes.

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AMERICAN STUDY

A group of 28 experienced American public school teachers had completed two different 5-day training sessions in cognitive-strategy instruction and in methods of mediated learning. In regard to implementation experience, each of these teachers (after training) had systematically implemented cognitive-strategy instruction through the explicit teaching of cognitive skills with their students at least twice per week for nearly a full year; their teaching also included metacognitive discussion with their students within each of the at-least-twice weekly teaching episodes. Cognitive strategies taught within the context of subject matter included organization, analysis, comparison, categorization, sequencing, and logic.

After one year of implementing thinking skills instruction following their training these teachers were asked to write in narrative form the answers to the following self-reflective questions:

1. How are you approaching problem-solving differently yourself now?
2. What are you doing differently as a teacher as a result of teaching thinking skills?

Table I provides a categorized tally in descending order of frequency of the responses made by the American teachers to this open-ended narrative instrument.

(Table I about here)

Metacognition

In regard to Question 1 relating to how the individual is now approaching personal problem-solving, we see that the highest frequency responses related to metacognition. Some example of actual responses in this category were:

- I now think more seriously about organizing information.

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- ❖ I stop to think about the steps I have just gone through.
- ❖ I am more aware of my thought processes.

Use of Multiple strategies

The second highest frequency was responses related to the respondent's use of multiple strategies in solving a problem. Some examples of responses here were:

- ❖ I am more aware of coming at a problem [in my life] from other perspectives.
- ❖ I realize that many answers and solutions are acceptable in many situations.
- ❖ I realize that there is more than one way to go about something.

Self-Expectations

The third highest frequency was responses related to higher self-expectations in problem-solving situations. Some examples were:

- ❖ I have learned to stretch my boundaries.
- ❖ I approach problems now by not giving up.
- ❖ It's nice to know I can do it.

A most telling response from one American teacher which fits either into the metacognitive or the self-expectation category was:

> My arguments with my husband have become quite fun. I can more easily present my point of view and back it up with specific examples. I feel more organized in my thoughts and do not respond on such an emotional level.

One may surmise that something significant has changed in this person's family interaction!

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The American teachers' responses to Question 2 relating to how they saw their own teaching styles had changed also had identifiable categories.

Metacognitive Activities

We see in Table I that the highest-frequency responses related to applying metacognitive methods in the classroom. Some examples of actual responses in this category were:

- I ask my students how and what strategies they use.
- When a student gives answers, I want to know how he arrived at it.
- I ask students why or how they did something.

Restraint of impulsivity in Students

A second highest frequency response category was related to restraining impulsivity in students. Examples of these responses were:

- I now allow an individual time to think.
- I allow time for more thinking.
- I am more systematic in allowing students the necessary learning time.

Questioning Strategies

The third-highest frequency response related to the asking of higher-order questions to students. Examples were:

- I feel that the training [in thinking skills] helped me to become a more introspective teacher, and to ask better questions of myself and of students.
- I use probing questions now.
- I ask more questions; a variety of them.

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Let us now compare these American results with those from the Costa Rican group of teachers.

COSTA RICAN STUDY .

For comparison purposes, a separate sample of experienced public school teachers under similar conditions was drawn from teachers in the public schools in the San Jose, Costa Rica, region. Twelve teachers were identified, similar to the American cohort described above, based on their interest in learning about ways to change their teaching to incorporate higher-level cognitive functions as well as in ways to assist their colleagues in the same venture. Also, similar to the American cohort, this group had completed two 5-day in-depth training sessions in teaching thinking skills, separated by seven months; during this time period, the Costa Rican cohort had implemented these techniques with students as well as shared these methods with fellow teachers in one or more schools in their region. Thinking skill strategies were the focus of their in-service training course. Thus, both the American and Costa Rican cohorts were similar in preparation and implementation of thinking skills instruction.

As with the American cohort, on the final day of their total of ten days of in-service training, all participants were asked to respond to the same questions related to how their own thinking had changed since beginning the training and implementation, and how their own teaching had also changed. Like the Americans, the Costa Ricans had implemented cognitive strategies explicitly at least twice per week for the time period with their students. Again, an open-ended narrative style was sought for the answers to each of these questions. Participants responded in writing in Spanish, and a certified translator translated all of the written responses into English for purposes of analysis.

Table II provides a categorized summary of these responses made by the Costa Rican teachers to the same narrative instrument.

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(Table II about here)

Reflective/Less Impulsive

An examination of Table II indicates the highest frequency for the combined similar categories of being less impulsive and taking time to reflect before attempting to solve a personal problem. Some examples of such responses were:

- I take time now to reflect before I start to look for a solution.
- I have learned to slow down before I start solving a problem.
- I find myself much less impulsive than before we did the training.

Careful Sequence of Steps

The next highest frequency response was the use of a careful sequence of steps in seeking solutions to problems in their lives. Examples were:

- I plan out a set of steps before I look for solutions
- I find myself using processes like analysis, comparison, organizing, etc.
- There is an important order in doing some things first before other things, when I try to solve a problem.

Metacognition

The third highest category related to metacognitive activities; examples were:

- I think about my thinking much more than before.
- I use metacognition when I try to figure out how I got a solution.
- I know myself and my own thought processes much better now since our workshops.

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The investigator also had an opportunity to individually interview this same cohort one day after they had completed the written responses, and asked individuals to note how they would characterize their own thinking before the training. A variety of individual responses included the following statements:

- Unconscious (1 respondent)
- Mechanical (1)
- Slow (1)
- Non-reflective (1)
- Unorganized (1)
- Unable to identify causes for effects (1)
- Blindly accepting other people's ideas (1)
- Non-analytical (1)
- Non-evaluative (1)
- Not based on any strategies (1)
- Often giving up when I faced a difficult problem (1)
- Impulsive (1)

The Costa Rican teachers' responses to Question 2 about self-perceived changes in their teaching style were categorized.

Labeled Sequence of Steps

A high frequency of responses was found in the category of using a labeled sequence of mental steps in asking students to do higher-level problem-solving. Examples of the responses were:

- I ask my students to follow a series of steps, with labels like "collect data", "organize it", "find a pattern", etc.

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- I tell students to remember to, for instance, compare and then categorize and then make conclusion.

Planned Strategies

The next highest frequency response was in using pre-planned teaching strategies with students. Examples were:

- I think out what I will do first, second, third, etc., when I teach--I did not do that before.
- I am more careful about planning what I will teach, step by step.

Active Learning

The third high-frequency category of responses were related to encouraging students to be active learners. Some examples were:

- I ask students to do more discussing than before.
- I tell students they will have to work to find some answers themselves; I will not give them the answers immediately.

Less emphasis on information

An equally high number of responses were in the category of changing their teaching to go beyond giving of facts and information. Examples were:

- We put more time now on thinking and discussion ideas than before.
- I don't emphasize memorizing facts as much as before; I work now on students to do things like evaluate or analyze the information.

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DISCUSSION

The pattern in all of the responses in the three cohorts fits well with Costa's (1985) taxonomy of those teacher behaviors that correlate with higher levels of student thinking; a subset of the teacher behaviors reported by the teachers in this study implicitly included the Arthur Costa-identified activities of questioning, wait time, use of cognitive vocabulary, and organization of student activities to promote mediation.

Debray (1991) looked at the effect of thinking skills programs on teachers, who expressed to her that their "whole pedagogic approach has been changed by participating in it." She continues that, in one program for teaching thinking the program's "frame of mind transformed their way of teaching their own subjects since it threw light on what is involved in thinking and intelligence." These points, then, help to explain the results found in the current study with both cohorts.

From the above sets of responses, showing multiple examples in several categories, it is clear that when an adult is trained in and also implements instruction in thinking skills, the effects on the adult are relevant to the goals of the thinking skills program and also can be consciously perceived by the individual adult.

We see a striking similarity between the American group and the Costa Rican subjects' responses in how their teaching had changed and how they now viewed themselves as higher-level problem-solvers (Question 1). In particular, both the American and Costa Rican teachers' self-reports demonstrate gains in regard to:

1. More systematic application of strategies to their own thinking
2. More awareness of their own thinking processes
3. Reduced impulsitivity in their own thinking

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4. Application of specific problem-solving strategies to teaching children
5. Application of cognitive education methods to their general teaching, as opposed to only during those occasions when Thinking is the explicit focus of their teaching.

However, also see certain differences between the two groups of responses. In regard to the first question on the view of self as thinker, Tables I and II indicate that the American respondents' views of self as adult thinker included responses about higher expectations for themselves after the completion of the training (6 Americans vs. no Costa Ricans), and the ability to see another point of view (2 vs. Non); however, these are not critical differences. On the other hand, the Costa Rican teachers mentioned their new ability to: defend their own ideas (4 vs. No Americans) and use a set of carefully sequenced steps in their own thinking (11 vs. none). However, in different ways, both groups' members appear to see themselves as significantly changed adult thinkers now.

On Question 2 about self-view as a teacher of thinking strategies in the classroom, Tables I and II show that the Americans explicitly mentioned the classroom application of metacognition, while the Costa Ricans did not (the Costa Ricans mentioned metacognition only in reference to their own thinking); the Americans apparently made a connection between the new metacognitive strategies in their teaching and in their adult life. Also, the Americans mentioned applying the ideas of restraining impulsitivity to their students' thinking, while the Costa Ricans did not. On the other hand, the Costa Ricans mentioned three other effects on their teaching that no Americans mentioned--putting less emphasis on information for its own sake, emphasizing more active learning for its own sake, and labeling a sequence of steps for thinking for their students. These differences between the two cohorts in how they see themselves as implementers of thinking skills in the classroom emphasize some different aspects of the same corpus of strategies.

Because the in-service sessions were similar for both cohorts, a possible explanation of the differences between the two cohorts in self-view as implementers of thinking strategies

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may well result from the different educational milieu of the two countries; that is, the Costa Rican educational system has traditionally emphasized the mastery of subject matter (with little if any emphasis on processes) and also emphasized students' passive reception of information and knowledge, as opposed to American traditions of active student involvement. Thus, the newness of these dimensions of teaching for the Costa Rican teachers would be striking and thus would be explicitly mentioned in their reflection upon the impact of cognitive-strategy instruction on their teaching. Apparently the training had overall similar outcomes, but the perceived effects on themselves were viewed by the two groups of teachers with both similarities and differences due to their respective prior educational traditions.

CONCLUSION

From the consistency of these reported changes, it is clear that some important self-perceived changes have taken place in these teachers as the result of their training in and implementation of thinking skills programs, both for themselves as adults and for their general teaching styles.

It would be an over-generalization to infer that these effects are entirely universal and cross-cultural, based on investigation with only two different cultural/national groups of teachers. However, both groups were at the beginning quite different in terms of: language, culture, economic status (Costa Rica being a "third-world" nation), and educational system (Costa Rica being a strongly national educational system with a mandated national curriculum and relatively little local curricular autonomy by comparison with America). In spite of such differences, we see that both groups have demonstrated apparent similarities in their thinking and teaching styles according to their own perceptions; one may tentatively conclude that the similarity of responses of the two groups may well represent a general effect that may not be

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culture-bound, with the need to verify this effect through investigation with other national groups.

These effects would be consistent with those reported in the context of teaching teachers about thinking by Lampert (1997); she examined teachers' reflection on their ways of thinking, after teachers had changed their teaching toward a constructivist direction. She reported that among other effects, they had changed in their confidence "in their own ability to figure things out."

Shulman (1987) describes pedagogical reasoning in terms of a cycle of comprehension, transformation, delivery, and reflection. The teachers in the present study were involved in a kind of cycle of this nature--they first comprehended the new cognitive strategies (during their in-service sessions); then they were apparently "transformed" in these self-reported ways; they then "delivered" these strategies through classroom implementation; and now in the present study were led to reflect upon these processes and changes.

Thus, these findings may fit within some of the existing theoretical and empirical work in teacher development.

Important questions now arise for further investigation beyond this study:

1. To what extent would a non-Western cultural group of teachers react similarly to such training in the teaching of thinking?

2. What aspects of the implementation of cognitive education in the classroom, separate from in-service training, create any of the noted effects on teachers' self-perception as improved thinkers? That is, to what degree is the training alone, versus program implementation, at the root of such changes in teachers?

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3. Are such changes in teachers' self-perceptions unique to the cognitive education movement, or are they to be found also as the result of training in or implementation of other curricular innovations?

4. What will be the most effective ways to incorporate preparation in cognitive education into pre-service education programs such that new teachers may make these strategies a part of their repertoire throughout their careers, as opposed to the two cohorts in these studies who had this training only after a number of years as experienced teachers?

5. To what degree are these self-perceived teacher changes reflected in measurable changes in their students' thinking? Prior research has indicated measurable effects on students' thinking as the result of teachers' actions resulting from similar in-service education; however, the outcomes for the students of these particular teachers in this teacher-effects study were not gathered.

6. To what extent would the local supervisors (or other external observers) of teachers in these cohorts report similar changes in teaching style following the in-service training and implementation? Such data would provide another perspective to balance these self-reported changes.

This small comparative study may provide a platform for further investigations into this critical area of positive teacher change and its important ultimate effects on students. Much more data, of course, need to be collected on a wider and more systematic basis across classrooms of teachers of thinking to validate these results. In any case, the explicit teaching of thinking by specially prepared teachers in different cultures may provide positive results in a world whose complexity today demands effective problem-solvers if children are to reach their cognitive potential.

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Table I: American Teachers' Self-Views as Adult Thinkers and Teachers of Thinking
N=28

Response Category **As Adult Thinkers**	**Frequency**	Response Category **As Teachers of Thinking**	**Frequency**
A. Use of Multiple strategies	5/28	A. Direction Giving	2/28
B. Analysis of tasks	1/28	B. Questioning Strategies	4/28
C. Self-expectation	5/28	C. Metacognitive Activities	8/28
D. Point of View	2/28	D. Restrain of Impulsivity in Students	5/28
E. Decision-making	1/28	E. Analysis of Students	3/28
F. Metacognition	9/28	F. Multiple Strategies in Instruction	2/28
G. Restraint of impulsivity	2/28	G. Planning Instruction	3/28
H. Planning	2/28	H. Vocabulary	2/28
I. Vocabulary	2/28	I. Applications	1/28

NOTE: The total frequency of responses exceeds the N of the sample due to the nature of the activity in which respondents could provide one or more responses to each question.

Table II: Costa Rican Teachers' Self-Views as Adult Thinkers and Teachers of Thinking N=12

Response Category **Adult Thinkers**	**Frequency**	Response Category **Teachers of Thinking**	**Frequency**
A. Metacognition	5/12	A. Use planned strategies with children	7/12
B. Defend my own ideas	4/12	B. Less emphasis on straight information	4/12
C. Use some strategies	4/12	C. Use high-level questions	3/12
D. Reflect before solving a problem	8/12	D. Emphasize more active learning	3/12
E. Use analyzing, comparing, organizing	4/12	E. Using a labeled sequence of steps	10/12
F. Use a careful sequence of steps	11/12		
G. Beingless impulsive	7/12		

NOTE: The total frequency responses exceed the N of the sample, due to the opportunity to provide one or more responses to each item on the instrument.

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